M16C

Target Setup for the FoUSB Programmer

1.0 Abstract

The USB-Monitor is a low cost, compact interface that has two functions for Renesas' M16C Flash microcontrollers: 1) an in-system programmer with FoUSB (Flash-over-USB™) Flash Programmer, and 2) an in-circuit debugger tool with KD30 Debugger. The following article introduces, and shows examples of, how to configure the target hardware with Renesas' M16C Flash MCU to interface with the USB-Monitor for in-system programming.

2.0 Introduction

When used with the FoUSB Flash Programmer, it provides an in-system programming interface to the target Renesas M16C Flash MCU. In addition, when used with KD30, the USB-Monitor also provides an easy-to-use in-circuit debugging environment during application development.

The USB-Monitor, by taking advantage of Universal Serial Bus (USB), provides plug-and-play connectivity and fast data transfers between the computer and the M16C target board. The USB-Monitor is powered by Renesas' M37641 full speed USB Flash MCU, which also makes it upgradeable to support future Renesas M16C MCUs.

Powering the USB-Monitor is user selectable: USB Bus powered or Target powered. When used in bus-powered mode, the USB bus supplies power to the USB-Monitor and target board. When in target-powered mode, USB bus power is disconnected and the USB-Monitor sources power from the M16C target board. Renesas recommends to use Target Power Mode and NOT USB Bus Power Mode when connected to non-Renesas SKP target boards. If you plan to use the USB-Monitor to supply power to non-SKP boards, please contact Renesas representative for details and assistance.

Aside from a standalone kit (RTA-FoUSB-MON), the USB-Monitor comes included with the following Renesas Starter Kits:

- MSV30102-SKP
- MSV30262-SKP
- MSV30245-SKP
- M16C System Evaluation Kit

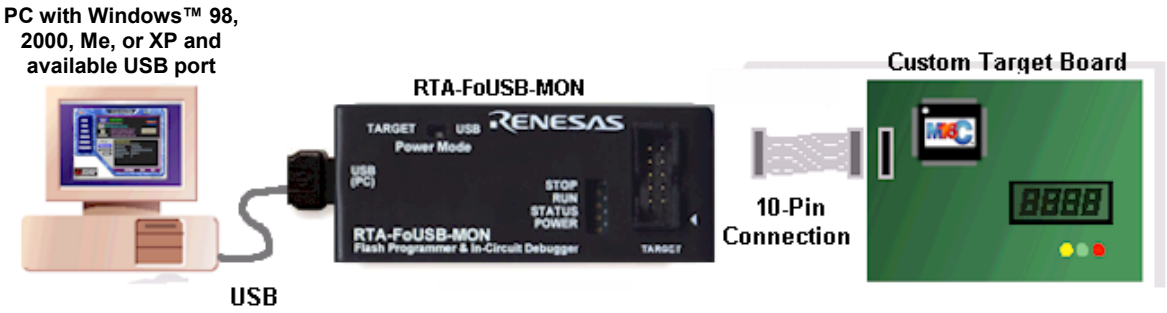


Figure 1 USB-Monitor System Connectivity

A picture of the USB-Monitor with key components indicated is shown below.

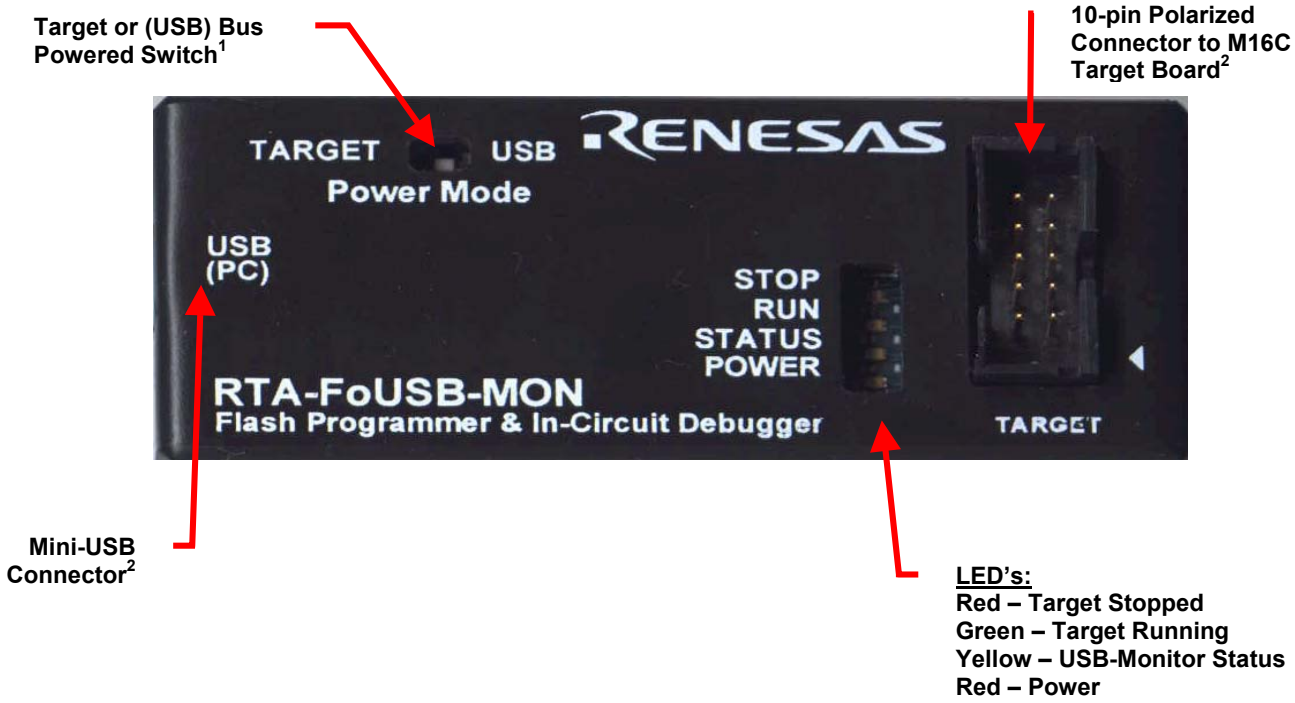


Figure 2 USB-Monitor

Note:
1. The USB Bus Power Mode was designed to supply power to Renesas SKP boards.

If non-Renesas SKP boards (i.e. customer developed M16C board) are used as target boards, use the USB-Monitor in Target Power mode. Contact your Renesas representative if you plan to use the USB-Monitor in Bus Power mode to supply power to your non-SKP target board.

2. The USB-Monitor ships with a 6' mini USB cable to connect to your PC and a 6" 10-pin flat ribbon target cable to connect to the M16C target board.

3. The USB-Monitor requires 5V for re-programming if a new MCU file (MMI) needs to be downloaded to the USB-Monitor (i.e. when the target MCU selected does not match the MCU file on the USB-Monitor). To accomplish this, disconnect the USB-Monitor from the target, set to Bus Power Mode, and then download new MCU file. After MCU file has been downloaded, switch back to Target Power Mode.

3.0 Hardware Connectivity for In-System Programming

This section describes the hardware connections to the USB-Monitor for in-system programming purposes. Examples for different M16C MCU's are shown at the end of the section.

The USB-Monitor connects to an M16C target board through a polarized, .100" (2.54mm), 10-pin connection using a flat ribbon cable. It communicates with the M16C MCU using the boot UART/SIO in a clocked SIO configuration. The signals used and how these signals are assigned is described below.

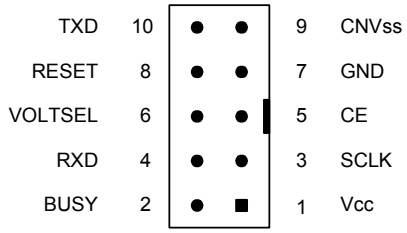


Figure 3 Target Board 10-Pin Header/Connector Signal Assignment

Note: All target interface lines are in high impedance state until instructed to do otherwise by the FoUSB Programmer application.

3.1 Vcc – Power Supply Pin

This provides the common connection point for power between USB-Monitor and the target board. This must be connected to the target board's Vcc line/plane.

In Target Power mode, the USB-Monitor requires at least 3.3V (5.0V max) and 45mA to operate properly.

3.2 Busy – Target MCU SIO Busy Signal

This line indicates whether the target is busy (and cannot receive data) or not. This must be connected to the target MCU's boot UART/SIO BUSY (CTS/RTS) pin.

This pin may be used for other applications as long as the user ensures that the USB-Monitor can drive the pin to valid levels with 5mA current.

3.3 SCLK – Target MCU Serial Clock Signal

This clock is used for synchronous serial communication between USB-Monitor and target board. This must be connected to the target MCU's boot UART/SIO SCLK pin.

This pin may be used for other applications as long as the user ensures that the USB-Monitor can drive the pin to valid levels with 5mA current.

3.4 RXD –Target MCU Receive Data Input Signal (USB-Monitor Transmit Data Output Signal)

This is the USB-Monitor SIO transmit data output. This must be connected to the target MCU's boot UART/SIO receive data input (RXD) pin.

This pin may be used for other applications as long as the user ensures that the USB-Monitor can drive the pin to valid levels with 5mA current.

3.5 CE Pin

This pin is used to enter boot mode for programming of the target M16C MCU. Not all M16C MCU's have a CE pin. If a CE pin exists on the target MCU, it should be connected to this pin (refer to serial mode flash programming in the target MCU's datasheet). If not, leave pin unconnected.

If the target MCU's CE pin is used as input, isolate the driving circuit from the header connection with a 1Kohm resistor.

If to be left unconnected (if users decides to), care must be taken to ensure that the target MCU's CE pin has a high signal level using a pull-up resistor during any programming operations.

3.6 EPM Pin (in Target Power Mode)

In Target Power Mode, the pin is used to control target MCU's EPM pin (if it exists on the target MCU). EPM pin is used during programming of the target MCU. If this pin exists on the target MCU, it should be connected to the header (refer to serial mode flash programming of the target MCU's datasheet). If not, leave unconnected.

If the target MCU's EPM pin is used as input, isolate the driving circuit from the header connection with a 1Kohm resistor.

If the EPM pin of the M16C MCU is left unconnected (no external circuit and not connected to 10-pin header), care must be taken to ensure that the target MCU's EPM pin has a high signal level by a pull-up resistor during any programming operations.

3.7 GND – Ground Pin

This provides the common point where the USB-Monitor ground and target board ground planes can be connected. This must be connected to target board's GND line/plane.

3.8 RESET – Target MCU Reset Signal

This active low signal is used by the USB-Monitor to reset the target MCU. This must be connected to the target board's reset circuit or target MCU's reset pin.

The user must ensure that the USB-Monitor can drive the pin to a valid low level with 5mA current.

3.9 CNVss – Target MCU CNVss Pin

This active high signal is used by the USB-Monitor to control the target MCU's CNVss pin for programming purposes. This must be connected to the target MCU's CNVss pin. During normal operation, this pin must have a low signal. To accomplish this, connect a 10K (nominal) pull-down resistor. See M16C MCU datasheet on CNVss pin description for details.

3.10 TXD – Target MCU Transmit Data Output Signal (USB-Monitor Receive Data Input Signal)

This is the USB-Monitor SIO receive data input. This must be connected to the target M16C MCU's boot UART/SIO transmit data output (TXD) pin.

This pin may be used for other applications as long as the user ensures that the USB-Monitor can drive the pin to valid levels with 5mA current.

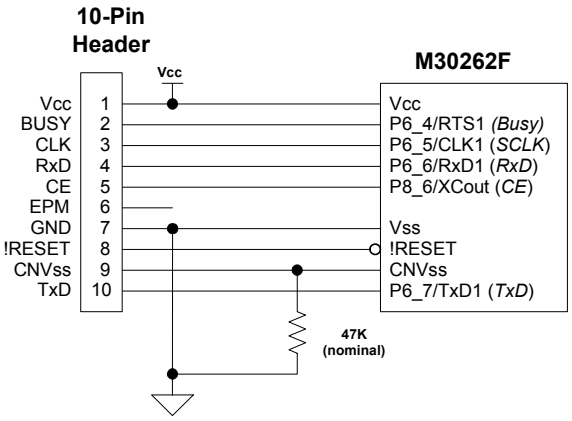
3.11 Hardware Summary and Precautions

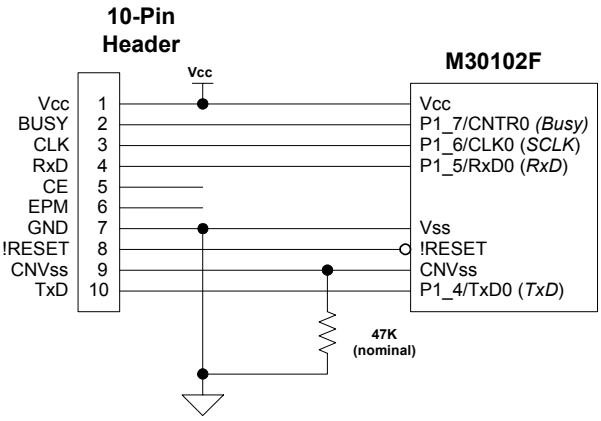
- Connect pull-down resistors to the CNVss line.
- Connect Reset line to the target MCU Reset pin or the target board's reset circuit.
- If EPM or CE lines are used as input pins, isolate the driving circuit from the 10-pin header using a 1Kohm resistor.
- If possible, avoid using the boot SIO/UART pins for other purposes. If not, ensure the lines can be driven in boot mode.
- Table 1 lists the M16C Flash MCU's supported and corresponding CE or EPM pin support and the boot UART/SIO.

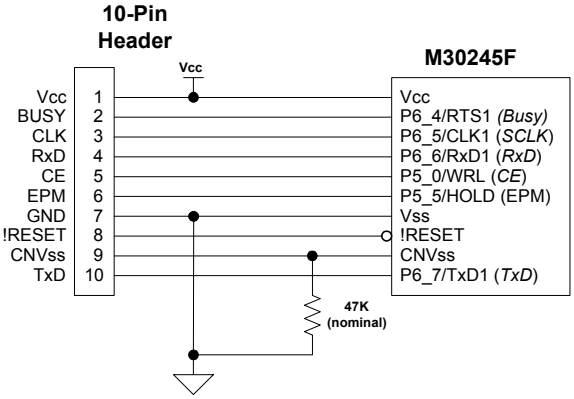
Table 1 M16C MCU Support Summary

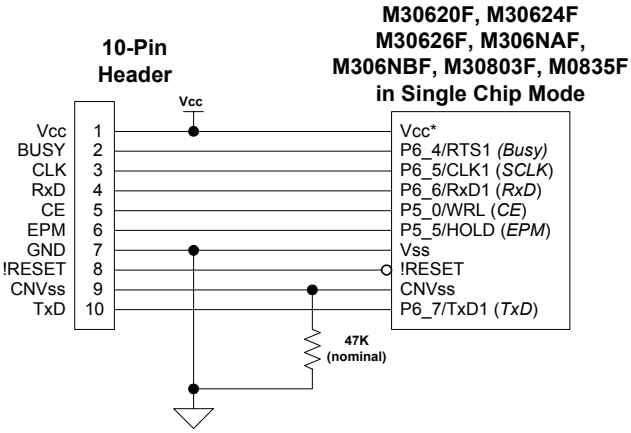
M16C MCU	CE/EPM Pin	Boot UART/SIO
M30100F3	None	UART0
M30245FC	Both	UART1
M30262F8	CE	UART1
M3062GF8N	Both	UART1
M30620FCA	Both	UART1
M30624FGA	Both	UART1
M30626FGP	Both	UART1
M306V7FG	Both	UART0

Examples of target board hardware connection to10-pin header (USB-Monitor) when used for in-system programming only. If you cannot find your M16C Flash MCU in the examples shown, please contact Renesas representative for assistance.

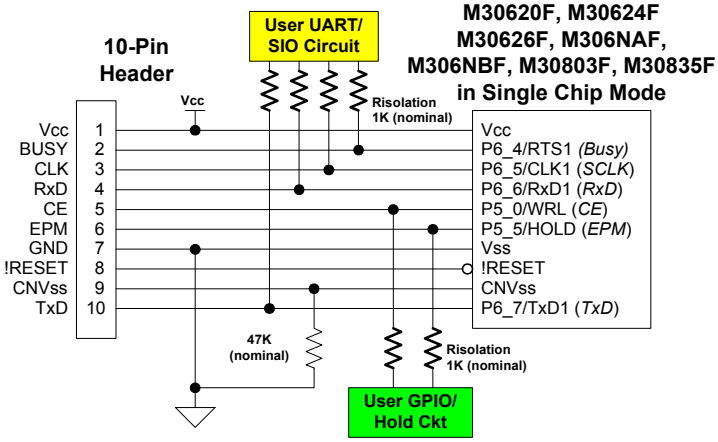








** For M30626F (M16C/62P), connect to Vcc1.*



When only used in programming (i.e. no debug operation) and user uses boot UART, CE, and EPM pins, connect 1K (nominal) isolation resistors between user UART, CE, & EPM circuit and M16C MCU - 10-pin header connection.

Note: If you cannot find your M16C Flash MCU in the examples shown, please contact Renesas representative for assistance.

4.0 Conclusion

The USB-Monitor is an easy-to-use interface for setting up an M16C MCU development environment to support in-system programming. It does not require a lot of resources from the target board. Correct hardware connectivity will guarantee proper operation.

5.0 Reference

Renesas Technology Corporation Semiconductor Home Page

http://www.renesas.com

E-mail Support

support_apl@renesas.com

User's Manual

- RTA-FoUSB-MON User's Manual
- Target Setup for In-Circuit Debugger App Note
- Firmware Requirements for In-Circuit Debugger Support App Note

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